

CLAIMS

1. A method for preventing copying of a compact disk (CD) using an unauthorized readout device, the method comprising:

preparing content to be written to a session in a Program Area of the CD;

generating control information for writing to a Program Memory Area (PMA) of the CD, which control information, when read by the unauthorized readout device, renders the unauthorized readout device incapable of properly reading the session from the CD; and

recording the content and the control information on the CD.

2. A method according to claim 1, wherein recording the content and the control information comprises making the recording in a Disk At Once (DAO) mode.

3. A method according to claim 2, wherein the CD is not a rewritable CD.

4. A method according to claim 1, wherein generating the control information comprises inserting erroneous data in the PMA.

5. A method according to claim 4, wherein inserting the erroneous data comprises inserting parameters instructing a Compact Disk Rewritable (CD-RW) compatible readout device to skip one or more tracks of the content on the CD.

6. A method according to claim 4, wherein inserting the erroneous data comprises inserting parameters instructing a Compact Disk Rewritable (CD-RW) compatible readout

device to skip the content in one or more time intervals in one or more tracks on the CD.

7. A method according to claim 4, wherein inserting the erroneous data comprises inserting parameters indicating that a track on the CD is incomplete.

8. A method according to claim 4, wherein inserting the erroneous data comprises inserting parameters identifying an audio track on the CD as a digital mode track.

9. A method for preventing copying of a compact disk (CD) using an unauthorized readout device, the method comprising:

preparing a first Table Of Contents (TOC) with respect to an audio session to be recorded on the CD, the first TOC referring to track numbers in the audio session;

preparing a second TOC with respect to a data session to be recorded on the CD, the second TOC referring to the same track numbers as the first TOC; and

recording the audio and data sessions on the CD together with the first TOC and the second TOC.

10. A method according to claim 9, wherein preparing the first TOC comprises recording timing information with respect to the track numbers, and wherein preparing the second TOC comprises modifying the timing information recorded in the first TOC, and recording the modified timing information with respect to the same track numbers in the second TOC.

11. A method according to claim 9, wherein the first TOC indicates that one or more of the tracks are audio mode tracks, and wherein preparing the second TOC comprises

indicating in the second TOC that the one or more tracks are not audio mode tracks.

12. A method for preventing copying of a compact disk (CD) using an unauthorized readout device, the method comprising:

preparing data to be written to a sector of the CD, the sector comprising a predetermined number of frames in accordance with an applicable standard, each of the frames comprising multiple symbols, such that in accordance with the applicable standard, each of the frames is to begin with first and second synchronization symbols;

arranging the symbols in at least one of the frames so that the second synchronization symbol occurs before the first synchronization symbol; and

recording the symbols in the sector on the CD.

13. A method according to claim 12, wherein arranging the symbols comprises arranging the first and second synchronization symbols in the at least one of the frames so that they are not consecutive.

14. A method according to claim 12, wherein the first and second synchronization symbols in the at least one of the frames are arranged so that the at least one of the frames does not begin with either the first or the second synchronization symbol.

15. A method according to claim 12, wherein the applicable standard comprises standard 908 of the International Electrotechnical Commission, such that the predetermined number of the frames in the sector is 98, and the first and second synchronization symbols comprise sub-code symbols S0 and S1.

16. A method for copy protection, comprising:

receiving data in a recording module representing content to be recorded on a recording medium, the data including an indication that the content is to be protected from unauthorized copying;

responsive to the indication, signaling a protection module to initiate a protection protocol in synchronization with the recording module;

generating control information using the protection module so as to prevent the unauthorized copying of the content that is to be protected;

conveying the control information from the protection module to the recording module, in accordance with the protocol;

combining the control information with the data representing the content in the recording module; and

recording the data combined with the control information on the recording medium.

17. A method according to claim 16, wherein signaling the protection module comprises conveying sub-code channel information for use by the protection module in generating the control information.

18. A method according to claim 17, wherein the control sub-code channel information comprises a table of contents (TOC) of the data representing the content.

19. A method according to claim 17, wherein generating the control information comprises generating the control information responsive to the sub-code channel information, substantially without receiving the data representing the content at the protection module.

20. A method according to claim 16, wherein signaling the protection module comprises sending a synchronization signal from the recording module to the protection module, and wherein conveying the control information comprises generating the control information in synchronization with the data, responsive to the synchronization signal.
21. A method according to claim 16, wherein signaling the protection module comprises authenticating the protection module before proceeding with the protection protocol.
22. A method according to claim 16, wherein generating the control information comprises preparing the control information so as to cause the recording module, upon combining the control information with the data, to effect logical changes in a sub-code channel associated with the data.
23. A method according to claim 16, wherein generating the control information comprises preparing the control information so as to cause the recording module, upon combining the control information with the data, to modify the data so that at least a portion of the data will be identified as erroneous with respect to an error correcting code associated therewith.
24. A method according to claim 16, wherein the recording medium comprises a compact disk (CD).
25. A method for copy protection, comprising:
providing a protection module for processing data associated with content to be recorded on a recording

medium, so as to inhibit, by processing of the data, unauthorized copying of the content;

downloading a script to the protection module over a communication link, the script providing an updated processing parameter for use in processing the data;

running the script at the protection module to determine the updated processing parameter;

processing the data using the protection module subject to the updated processing parameter; and

recording the processed data on the medium.

26. A method according to claim 25, wherein the protection module comprises a hardware logic unit dedicated to processing the data so as to inhibit the unauthorized copying.

27. A method according to claim 25, wherein the protection module comprises software program code for running on a general-purpose processing unit.

28. A method according to claim 25, wherein downloading the script comprises encrypting the script before downloading it to the protection module, and wherein running the script comprises authenticating and decrypting the script.

29. A method according to claim 25, wherein processing the data comprises effecting logical changes in a sub-code channel associated with the data.

30. A method according to claim 25, wherein the medium comprises a compact disk (CD).

31. Apparatus for preventing copying of a compact disk (CD) using an unauthorized readout device, the apparatus comprising:

a protection processor, adapted to prepare content to be written to a session in a Program Area of the CD, and to generate control information for writing to a Program Memory Area (PMA) of the CD, which control information, when read by the unauthorized readout device, renders the unauthorized readout device incapable of properly reading the session from the CD; and

a recording device, coupled to receive the content and the control information from the protection processor and adapted to record the content and the control information on the CD.

32. Apparatus according to claim 31, wherein the recording device is adapted to record the content and the control information in a Disk At Once (DAO) mode.

33. Apparatus according to claim 32, wherein the CD is not a rewritable CD.

34. Apparatus according to claim 31, wherein the protection processor is adapted to insert erroneous data in the PMA.

35. Apparatus according to claim 34, wherein the erroneous data comprise parameters instructing a Compact Disk Rewritable (CD-RW) compatible readout device to skip one or more tracks of the content on the CD.

36. Apparatus according to claim 34, wherein the erroneous data comprise parameters instructing a Compact Disk Rewritable (CD-RW) compatible readout device to skip the content in one or more time intervals in one or more tracks on the CD.

37. Apparatus according to claim 34, wherein the erroneous data comprise parameters indicating that a track on the CD is incomplete.

38. Apparatus according to claim 34, wherein the erroneous data comprise parameters identifying an audio track on the CD as a digital mode track.

39. Apparatus for preventing copying of a compact disk (CD) using an unauthorized readout device, the apparatus comprising:

a protection processor, adapted to prepare a first Table Of Contents (TOC) with respect to an audio session to be recorded on the CD, the first TOC referring to track numbers in the audio session, and to prepare a second TOC with respect to a data session to be recorded on the CD, the second TOC referring to the same track numbers as the first TOC; and

a recording device, coupled to receive the first TOC and the second TOC from the protection processor, and to record the audio and data sessions on the CD together with the first TOC and the second TOC.

40. Apparatus according to claim 39, wherein the protection processor is adapted to record timing information with respect to the track numbers in the first TOC, and to modify the timing information recorded with respect to the track numbers in the first TOC for inclusion in the second TOC with respect to the same track numbers.

41. Apparatus according to claim 39, wherein the first TOC indicates that the tracks are audio mode tracks, and wherein the protection processor is adapted to record an

indication in the second TOC that the tracks are not audio mode tracks.

42. Apparatus for preventing copying of a compact disk (CD) using an unauthorized readout device, the apparatus comprising:

a protection processor, adapted to receive data to be written to a sector of the CD, the sector comprising a predetermined number of frames in accordance with an applicable standard, each of the frames comprising multiple symbols, such that in accordance with the applicable standard, each of the frames is to begin with first and second synchronization symbols, the protection processor being adapted to arrange the symbols in at least one of the frames so that the second synchronization symbol occurs before the first synchronization symbol; and

a recording device, coupled to receive the symbols from the protection processor, and to record the symbols in the sector on the CD.

43. Apparatus according to claim 42, wherein the protection processor is adapted to arrange the first and second synchronization symbols in the at least one of the frames so that they are not consecutive.

44. Apparatus according to claim 42, wherein the protection processor is adapted to arrange the first and second synchronization symbols in the at least one of the frames are arranged so that the at least one of the frames does not begin with either the first or the second synchronization symbol.

45. Apparatus according to claim 42, wherein the applicable standard comprises standard 908 of the

International Electrotechnical Commission, such that the predetermined number of the frames in the sector is 98, and the first and second synchronization symbols comprise sub-code symbols S0 and S1.

46. Apparatus for copy protection, comprising:

a protection module, adapted to generate control information using the protection module so as to prevent unauthorized copying of protected content; and

a recording module, adapted to receive data representing the content to be recorded on a recording medium, the data including an indication that the content is to be protected from the unauthorized copying, such that responsive to the indication, the recording module signals the protection module to initiate a protection protocol in synchronization with the recording module and conveys the control information from the protection module to the recording module, in accordance with the protocol, and then receives the control information generated by the protection module and combines the control information with the data representing the content, so as to record the data combined with the control information on the recording medium.

47. Apparatus according to claim 46, wherein the recording module is adapted to convey to the protection module sub-code channel information for use by the protection module in generating the control information.

48. Apparatus according to claim 47, wherein the control sub-code channel information comprises a table of contents (TOC) of the data representing the content.

49. Apparatus according to claim 47, wherein the protection module is adapted to generate the control

information responsive to the sub-code channel information, substantially without receiving the data representing the content.

50. Apparatus according to claim 46, wherein the recording module is adapted to send the protection module a synchronization signal, and wherein the protection module is adapted to generate the control information in synchronization with the data, responsive to the synchronization signal.

51. Apparatus according to claim 46, wherein the recording module is adapted to authenticate the protection module before proceeding with the protection protocol.

52. Apparatus according to claim 46, wherein the protection module is adapted to prepare the control information so as to cause the recording module, upon combining the control information with the data, to effect logical changes in a sub-code channel associated with the data.

53. Apparatus according to claim 46, wherein the protection module is adapted to prepare the control information so as to cause the recording module, upon combining the control information with the data, to modify the data so that at least a portion of the data will be identified as erroneous with respect to an error correcting code associated therewith.

54. Apparatus according to claim 46, wherein the recording medium comprises a compact disk (CD).

55. Apparatus according to claim 46, wherein the apparatus comprises a programmable processing unit, and

wherein the recording and protection modules are implemented as processes running on the processing unit.

56. Apparatus for copy protection, comprising:

a network interface, adapted to download a script over a communication link, the script providing an updated processing parameter for use in processing data associated with content to be recorded on a recording medium so as to inhibit unauthorized copying of the content;

a protection module, adapted to run the script so as to determine the updated processing parameter and to process the data, subject to the updated processing parameter, so as to inhibit the unauthorized copying; and

a recording device, coupled to receive the processed data from the protection module, and to record the processed data on the medium.

57. Apparatus according to claim 56, wherein the protection module comprises a hardware logic unit dedicated to processing the data so as to inhibit the unauthorized copying.

58. Apparatus according to claim 56, wherein the protection module comprises a general-purpose processing unit, programmed with software code for processing the data.

59. Apparatus according to claim 56, wherein the script is encrypted before downloading it to the protection module, and wherein the protection module is adapted to authenticate and decrypt the script.

60. Apparatus according to claim 56, wherein the protection module is adapted to process the data so as to

effect logical changes in a sub-code channel associated with the data.

61. Apparatus according to claim 56, wherein the medium comprises a compact disk (CD).

62. A computer software product for preventing copying of a compact disk (CD) using an unauthorized readout device, the product comprising a computer-readable medium in which program instructions are stored, which instructions, when read by a computer, cause the computer to prepare content to be written to a session in a Program Area of the CD, and to generate control information for writing to a Program Memory Area (PMA) of the CD, which control information, when read by the unauthorized readout device, renders the unauthorized readout device incapable of properly reading the session from the CD.

63. A product according to claim 62, wherein the instructions cause the computer to prepare the content and the control information for recording in a Disk At Once (DAO) mode, regardless of whether or not the CD is a rewritable CD.

64. A product according to claim 62, wherein the instructions cause the computer to insert erroneous data in the PMA.

65. A product according to claim 64, wherein the erroneous data comprise parameters instructing a Compact Disk Rewritable (CD-RW) compatible readout device to skip one or more tracks of the content on the CD.

66. A product according to claim 64, wherein the erroneous data comprise parameters instructing a Compact

Disk Rewritable (CD-RW) compatible readout device to skip the content in one or more time intervals in one or more tracks on the CD.

67. A product according to claim 64, wherein the erroneous data comprise parameters indicating that a track on the CD is incomplete.

68. A product according to claim 64, wherein the erroneous data comprise parameters identifying an audio track on the CD as a digital mode track.

69. A computer software product for preventing copying of a compact disk (CD) using an unauthorized readout device, the product comprising a computer-readable medium in which program instructions are stored, which instructions, when read by a computer, cause the computer to prepare a first Table Of Contents (TOC) to be recorded on the CD with respect to an audio session, the first TOC referring to track numbers in the audio session, and to prepare a second TOC to be recorded on the CD with respect to a data session, the second TOC referring to the same track numbers as the first TOC.

70. A product according to claim 69, wherein the instructions cause the computer to record timing information with respect to the track numbers in the first TOC, and to modify the timing information recorded with respect to the track numbers in the first TOC for inclusion in the second TOC with respect to the same track numbers.

71. A product according to claim 69, wherein the first TOC indicates that the tracks are audio mode tracks, and wherein the instructions cause the computer to record an

indication in the second TOC that the tracks are not audio mode tracks.

72. A computer software product for preventing copying of a compact disk (CD) using an unauthorized readout device, the product comprising a computer-readable medium in which program instructions are stored, which instructions, when read by a computer that receives data to be written to a sector of the CD, the sector comprising a predetermined number of frames in accordance with an applicable standard, each of the frames comprising multiple symbols, such that in accordance with the applicable standard, each of the frames is to begin with first and second synchronization symbols, cause the computer to arrange the symbols in at least one of the frames to be recorded to the sector of the CD so that the second synchronization symbol occurs before the first synchronization symbol.

73. A product according to claim 72, wherein the instructions cause the computer to arrange the first and second synchronization symbols in the at least one of the frames so that they are not consecutive.

74. A product according to claim 72, wherein the instructions cause the computer to arrange the first and second synchronization symbols in the at least one of the frames are arranged so that the at least one of the frames does not begin with either the first or the second synchronization symbol.

75. A product according to claim 72, wherein the applicable standard comprises standard 908 of the International Electrotechnical Commission, such that the predetermined number of the frames in the sector is 98,

and the first and second synchronization symbols comprise sub-code symbols S0 and S1.

76. A computer software product comprising a computer-readable medium in which program instructions are stored, which instructions, when read by a computer, cause the computer to run a protection process and a recording process,

wherein the protection process generates control information so as to prevent unauthorized copying of protected content, and

wherein the recording module receives data representing the content to be recorded on a recording medium, the data including an indication that the content is to be protected from the unauthorized copying, such that responsive to the indication, the recording module signals the protection module to initiate a protection protocol in synchronization with the recording module and conveys the control information from the protection module to the recording module, in accordance with the protocol, and then receives the control information generated by the protection module and combines the control information with the data representing the content, so as to record the data combined with the control information on the recording medium.

77. A product according to claim 76, wherein the instructions cause the recording process to convey to the protection process sub-code channel information for use by the protection process in generating the control information.

78. A product according to claim 77, wherein the control sub-code channel information comprises a table of contents (TOC) of the data representing the content.

79. A product according to claim 77, wherein the instructions cause the protection process to generate the control information responsive to the sub-code channel information, substantially without receiving the data representing the content.

80. A product according to claim 76, wherein the instructions cause the recording process to send the protection process a synchronization signal, and cause the protection process to generate the control information in synchronization with the data, responsive to the synchronization signal.

81. A product according to claim 76, wherein the instructions cause the recording process to authenticate the protection process before proceeding with the protection protocol.

82. A product according to claim 76, wherein the instructions cause the protection process to prepare the control information so as to cause the recording process, upon combining the control information with the data, to effect logical changes in a sub-code channel associated with the data.

83. A product according to claim 76, wherein the instructions cause the protection process to prepare the control information so as to cause the recording process, upon combining the control information with the data, to modify the data so that at least a portion of the data

will be identified as erroneous with respect to an error correcting code associated therewith.

84. A product according to claim 76, wherein the recording medium comprises a compact disk (CD).

85. A computer software product comprising a computer-readable medium in which program instructions are stored, which instructions, when read by a computer, cause the computer to download a script over a communication link, the script providing an updated processing parameter for use in processing data associated with content to be recorded on a recording medium so as to inhibit unauthorized copying of the content, and further cause the computer to run the script so as to determine the updated processing parameter and to process the data for recording on the medium, subject to the updated processing parameter.

86. A product according to claim 85, wherein the script is encrypted before downloading it to the protection module, and wherein the instructions cause the computer to authenticate and decrypt the script.

87. A product according to claim 85, wherein the instructions cause the computer to process the data so as to effect logical changes in a sub-code channel associated with the data.

88. A product according to claim 85, wherein the medium comprises a compact disk (CD).

89. A data storage medium that is resistant to copying using an unauthorized readout device, the medium comprising a compact disk (CD) having a Program Area in which content is stored, and a Program Memory Area (PMA)

containing control information which, when read by the unauthorized readout device, renders the unauthorized readout device incapable of properly reading the session from the CD.

90. A medium according to claim 89, wherein the content and the control information are written to the CD in a Disk At Once (DAO) mode.

91. A medium according to claim 90, wherein the CD is not a rewritable CD.

92. A medium according to claim 89, wherein the control information in the PMA comprises erroneous data.

93. A medium according to claim 92, wherein the erroneous data comprise parameters instructing a Compact Disk Rewritable (CD-RW) compatible readout device to skip one or more tracks of the content on the CD.

94. A medium according to claim 92, wherein the erroneous data comprise parameters instructing a Compact Disk Rewritable (CD-RW) compatible readout device to skip the content in one or more time intervals in one or more tracks on the CD.

95. A medium according to claim 92, wherein the erroneous data comprise parameters indicating that a track on the CD is incomplete.

96. A medium according to claim 92, wherein the erroneous data comprise parameters identifying an audio track on the CD as a digital mode track.

97. A data storage medium that is resistant to copying using an unauthorized readout device, the medium comprising a compact disk (CD) that is not a rewritable

CD, the CD having a Program Area in which content is stored, and a Program Memory Area (PMA) containing control information.

98. A medium according to claim 97, wherein the content and the control information are written to the CD in a Disk At Once (DAO) mode.

99. A data storage medium that is resistant to copying using an unauthorized readout device, the medium comprising a compact disk (CD) having an audio session and a data session, the audio session including a first Table Of Contents (TOC) referring to track numbers in the audio session, and the data session including a second TOC referring to the same track numbers as the first TOC.

100. A medium according to claim 99, wherein the first TOC contains timing information with respect to the track numbers, and the second TOC contains modified timing information with respect to the same track numbers, different from the timing information in the first TOC.

101. A medium according to claim 99, wherein the first TOC indicates that the track numbers refer to audio mode tracks, and wherein the second TOC indicates that the same track numbers do not refer to audio mode tracks.

102. A data storage medium that is resistant to copying using an unauthorized readout device, the medium comprising a compact disk (CD) containing data in at least one sector thereon, the at least one sector comprising a predetermined number of frames in accordance with an applicable standard, each of the frames comprising multiple symbols, such that in accordance with the applicable standard, each of the frames is to begin

with first and second synchronization symbols, while in at least one of the frames in the at least one sector, the second synchronization symbol occurs before the first synchronization symbol.

103. A medium according to claim 102, wherein the at least one of the frames does not begin with either the first or the second synchronization symbol.

104. A medium according to claim 102, wherein the applicable standard comprises standard 908 of the International Electrotechnical Commission, such that the predetermined number of the frames in the sector is 98, and the first and second synchronization symbols comprise sub-code symbols S0 and S1.